

ED 093 095

## TITLE

Problems of Mental Development of Handicapped Children. Materials for 18th International Congress of Psychology.

## INSTITUTION

Academy of Pedagogical Sciences of the USSR, Moscow Inst. of Defectology.

PUB DATE  
NOTE

66

55p.

EDRS PRICE  
DESCRIPTORS

MF-\$0.75 HC-\$3.15 PLUS POSTAGE  
Child Development; \*Exceptional Child Research;  
Foreign Countries; \*Handicapped Children;  
\*Psychological Characteristics; \*Psychology  
\*Union of Soviet Socialist Republics; USSR

## IDENTIFIERS

## ABSTRACT

Presented are 46 brief statements by members of the Institute of Defectology in the Soviet Union on the psychology of mentally retarded children, children with cerebral insufficiency, blind and partially seeing children, deaf and hard of hearing children, and speech or language handicapped children. Examples of the 14 statements concerned with the psychology of mentally retarded children are the following titles: "Mental Peculiarities of Oligophrenic [retarded] Children Having Expressed Underdevelopment of Frontal Lobes of Brain", "Peculiarities of Realizing Spatial Notions by Mentally Retarded Children", "On the Rigidity of Intellectual Operations of Oligophrenics", and "Motor Disorders in Oligophrenic Children." Two of the four statements on the psychology of children with cerebral insufficiency are titled "Concerning the Rehabilitation of Higher Cortical Functions of Children with Cerebral Palsy" and "Spatial Disturbances in Children with Cerebral Palsy." The psychology of blind and partially seeing children is the focus of eight statements such as: "Compensatory Development of Blind Children", "Peculiarities of Speech Development in Blind Primary Schoolchildren", and "Biotelemetry in Studying Physical Development of Blind Children." The following titles are typical of the statements on the psychology of deaf and hard of hearing children: "The Sensory Basis of Lipreading", "Dactylic Speech as Means of Compensation in Teaching of Deaf Children", and "Comprehensive Studies of Preschool Children with Hearing Defects." The final group of four statements is concerned with problems of logopedics. (DB)



RSSR ACADEMY OF PEDAGOGICAL SCIENCES  
RESEARCH INSTITUTE OF DEFECTOLOGY

ED 093095

# PROBLEMS OF MENTAL DEVELOPMENT OF HANDICAPPED CHILDREN

Materials for XVIII International Congress of Psychology

U.S. DEPARTMENT OF HEALTH,  
EDUCATION & WELFARE  
NATIONAL INSTITUTE OF  
EDUCATION

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PUBLISHING HOUSE "PROSVESHCHENIE"

MOSCOW 1966

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N. V. YASHKOVA

# MENTAL PECULIARITIES OF OLIGOPHRENIC CHILDREN HAVING EXPRESSED UNDERDEVELOPMENT OF FRONTAL LOBES OF BRAIN

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At present the problem of oligophrenia holds one of the leading places in defectology. Various specialists take part in its studies. The discovery of chromosome diseases accompanied as a rule by innate imbecility is an important stage in studying the etiology of oligophrenia.

Complex dynamic investigations conducted for more than 20 years showed that the main thing in the pathogenesis of oligophrenia is substantially diffuse underdevelopment of surface layers of cerebral hemisphere cortex. Underdevelopment of these layers conditions sharp decrease of flexibility of nervous processes which impedes development of complex functional systems and leads to disturbance of the whole mental development, in particular to underdevelopment of abstract thinking.

Basing on peculiarities of pathogenesis we single out four forms of oligophreny. In this report we shall deal with that form of oligophrenia when diffuse, relatively surface affection of the cerebral cortex is combined with underdevelopment of its frontal lobes. A peculiar disturbance of motor activity distinctly comes out in the neurological status of these children on the background of diffuse symptomatics. Oligophrenic children of this group have higher specific forms of motor behaviour disturbed and elementary motor functions intact.

Speech of oligophrenic children of this group has a number of peculiarities. Though they have a sufficient stock of words and correctly build up phrases their speech is echolalic, imitative and abundant with stock phrases. The children often repeat expressions used by grown-ups without understanding their meaning. Specific disturbances of personality, emotional-voluntary sphere and purposive activities come out distinctly with the children of this group on the background of underdeveloped cognitive activities.



It is known that forms of mediate behaviour of a child appear in those cases when he not only perceives impressions of his surroundings but also is able to assess them and to determine a way of action on the basis of this appraisal. Though oligophrenic children of this group possess an ability to perceive the surroundings they only with difficulty create habits to assess adequately the perceived and transform it. Falling out of these links lies in the basis of spontaneity of their behaviour manifesting itself in inability to understand the situation and assess their own behaviour, in decrease of critics, in absence of genuine emotions. Complex mediate forms of behaviour are substituted with these children either by separate fragmentary acts, i.e. immediate reactions on each fragment of the situation, or by imitative forms of behaviour having the character of inert stereotypes.

## PSYCHOLOGY OF OLIGOPHRENIC SCHOOLCHILDREN'S ACTIVITY

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A certain peculiarity of not only mental processes but also of structure and motivation of activity is formed in the course of mentally retarded children's abnormal development.

As it is demonstrated by our investigations one may observe disturbances in the purposefulness of mentally retarded children's activities. This expresses itself in oligophrenic children's usual desire to begin performing a task without the proper preliminary orientation in it, without active thinking over the plan of action and the choice of means which would have provided for achieving the aim. Confronting with difficulties mentally retarded schoolchildren slide away from the task set and begin performing such actions and operations which carry them away from the original aim. If there is no necessary guiding by the teacher mentally retarded children treat the results without sufficiently critical approach. In performing separate actions they are guided only by immediate motives of activities which do not urge them to achieve a more general aim.

The analysis of materials received in the course of experiments permits to consider that the peculiarity of mentally retarded pupil's activities conspicuously affects their cognitive processes (memorizing, reproduction, thinking operations).

The peculiarity of mentally retarded children's activities also manifests itself in the character of transference of the past experience. If the necessary correctional-educational work is not

conducted with them they do not use earlier mastered experience in accordance with the requirements of the task set.

Some data concerning the motivation of mentally retarded children's activities have been received by us in studying the influence of the assessment of actions on their performing these actions.

Vocational activity plays a great part in overcoming defects of mentally retarded schoolchildren's activities. In the process of performing labour tasks which are understood as practically important and socially meaningful purposeful ways of oligophrenic schoolchildren's activities are formed and the level of motivation is raised, thus widening possibilities of their development.

### CONCERNING THE CONCRETENESS OF OLIGOPHRENIC CHILDREN'S THINKING

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In psychological and psychiatric literature published in our country and abroad there is plenty of data describing in a variety of ways the inferiority of verbal-logical thinking of oligophrenic children and the underdevelopment of their speech. Investigators usually maintained that mentally retarded people's thinking is based on their sensual cognition and therefore is concrete. Thus the concrete and the abstract were illegally opposed between themselves, and sensual and rational ways of cognition were recognized independent of each other.

It is demonstrated in the Soviet scientist's works that vagueness of images (ideas), weakness of their systematization and little dynamism, difficulties in actualizing adequate images are typical of oligophrenic children studying in primary forms of special schools for mentally retarded. They were also unable to fulfil a task requiring the replacement of the typical image of an object with its varieties. These peculiarities of interaction of images of memory between themselves and with the images of directly perceived objects manifest themselves in schematic and nonconcrete solving by oligophrenic children the problems requiring participation of reflective thinking based on perception.

By the moment they reach senior forms mentally retarded children show conspicuous progress in the development of speech, verbal-logical thinking, practical and labor activities. This positively influences on their perceptions and notions, assists them to overcome the defects in their reflective thinking based on perception. The concreteness of children's thinking in the process of practical and intellectual tasks performing also increases.

Studies of the change in the character of interconnection between sensual and rational components of oligophrenic children's cognitive activities in the process of education have allowed to find out potential possibilities for development of the concreteness of these children's thinking. When oligophrenic children reach higher school age, they conspicuously develop their ability of concrete thinking necessary for successful labor activities. This happens thanks to verbal communication with children, to influence of general education which has a correctional character and is directed not on training elementary habits but on developing a mentally retarded child's personality as a whole and on stimulating his mental activities.

### **DISTURBANCES OF EMOTIONAL-VOLUNTARY SPHERE IN OLIGOPHRENIC CHILDREN**

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The problem of peculiarities of oligophrenic children's emotional-voluntary sphere raised by L. S. Vygodsky has not lost its actuality at present. Meanwhile experimental investigations of psychological processes in this group of children are mainly aimed at discovering disturbances of their cognitive activities.

However a thorough analysis of these children's cognitive processes reveal a great role of affective disturbances in the structure of their intellectual deterioration (Works by E. A. Yevlahova, B. I. Pinsky, I. M. Solovyev, etc.). Special investigations of oligophrenic children's emotional-voluntary sphere revealed a number of peculiarities. While inertness and slow mobility of their emotional manifestations are characteristic of one group of children, the character of the other group is determined by the combination of inert reactions with the liability of the emotional sphere. We discovered the increased reactivity of these children towards the evaluation of their production, the instability of the level of pretensions (the work by L. I. Balakireva).

We have studied peculiarities of shaping of oligophrenic children's personality. While the ways of behaviour, the direction, emotional reactions of a healthy child depend not only on the attitude of and appraisal by the surrounding grown-ups but also on the self-appraisal, oligophrenic children's behaviour and emotional reactions are mainly conditioned by grown-up's attitude. The self-appraisal is poorly developed in them. This is evidently the reason of the paradoxicality of the structure of their affective sphere—the combination of emotional coarseness and abnormal liability to anguish.



## DETECTION OF THRESHOLDS OF CUTANEOUS ANALYZE 1 IN OLIGOPHRENIC CHILDREN

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To study the threshold sensitivity of the cutaneous analyzer in oligophrenic children, the skin of the forearm of the child was stimulated with alternating current, and with single impulses (through two copper electrodes with the area of 10 cm<sup>2</sup>, with the current of several milliamperes, or several tenths of a milliampere, from 50 to 2,000 cycles per second, and of 45 volts). The children reported the skin sensations. Reaction to stimulation was recorded plethysmographically.

The threshold values, depending on the frequency and intensity of the current, have been determined for 118 3rd to 8th graders at school for mentally retarded children.

The results show that high cutaneous sensitivity threshold values are characteristic for debiles (i.e. observed in 72% of the children). When single impulses are applied, the threshold values are much higher than for alternating current, which could be explained by the decreased ability of oligophrenic children for summation of nervous excitation.

## PECULIARITIES OF REALISING SPATIAL NOTIONS BY MENTALLY RETARDED CHILDREN

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Mentally retarded children experience significant difficulties in spatial orientation. This demands to work out special methods aimed at development by these children spatial notions and ideas and at their practical usage.

Psychologists have investigated in detail the peculiarities of mentally retarded schoolchildren's perception of spatial qualities of objects and their understanding spatial relations (I. M. Solovyev, K. I. Veresotskaya, Zh. I. Shif, E. Bödor and others).

Our investigation conducted on the material of mastering geographical knowledge has shown that sixth form pupils of special school solving geographical problems inaccurately or even distortedly realize their spatial notions. After receiving the task to indicate on a skeleton map a city the location of which on the map is known to them schoolchildren make gross mistakes.

However under certain conditions pupils happen to be in a position to solve analogous geographical tasks. The reproduction of the spatial location of one or another city becomes more

accurate when they have to indicate simultaneously three cities one of which is Budapest. Thus a system with a clear reference-point is created. This stimulates pupil's mental activities and gives them a chance to make a correlative analysis of the spatial location of these cities.

The results improve even more if before doing the task pupils are asked questions about the spatial location of these cities (in what direction from Budapest the city in question lies, what is the distance between them, etc.). By way of such verbal formulation the children widen the scope of their spatial notions connected with the location of the given city on the map. This is the distinction from the above mentioned conditions.

The investigation gives good reason to affirm that difficulties met by oligophrenic children in realizing spatial notions can be to a certain degree overcome by specially organized instruction. The data received may be used for planning the correctional and educational work with mentally retarded children.

## ON THE RIGIDITY OF INTELLECTUAL OPERATIONS OF OLIGOPHRENICS

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Some investigators (Levin, Kunin, Stevenson and Zigler, O'Connor, and others) noted a contradiction in the behaviour of oligophrenic children. Sometimes these children, besides being "rigid", i.e. unable to change their actions in accordance with a given situation, show an ability to shift easily. Our aim was to discover the reasons of this contradiction in the behaviour of the oligophrenic children.

The oligophrenic children were given a dictation to write in which they had to write a certain letter differently from the others (for instance the text was written in Russian while the letter "a" had to be written in Georgian). In one series of experiments the children were to write the words in such a way that each letter would be in every other square of a checked paper. In another series of experiments they wrote the words the usual way, together.

In the critical experiments the words contained two "a" in the middle and in the end of the word.

The oligophrenic children who were writing the words in the setting experiments in the ordinary way (not in every other square), showed a "rigidity" of behaviour. They used the Georgian "a" only in the last syllable, while in the middle of words they used Russian. It is our opinion that this group of children worked



out a certain scheme of action, a set to replace the letter "a" in the end of the word, and as a result of this set was unable to differentiate the material of the critical experiment.

When they wrote letters of words out in every other square, the oligophrenic children were quite successful in coping with the task of the critical experiment. They wrote the Georgian "a" correctly both in the middle and in the end of the word. It may be supposed that in this group of children writing in every other square meant the material was not integrated into one certain structure, and they did not work out a set to replace only the last letter. That is why there was no rigid behaviour.

The experiments show that oligophrenic children display rigidity of actions in such conditions, when, after they unite elements into one structure, they have to differentiate within this unit. When the material is separated into small portions they do not display rigidity.

These results show that if the principle of uniting material is inaccessible or complicated for the oligophrenic children (for instance, uniting subjects according to their abstract features), they can display mainly nonrigid behaviour. It is this state that must determine their paradoxical "elasticity" in a number of cases. This hypothesis was confirmed by experiments in which fixated set was formed to perceive a subject which was portrayed on a picture. When fixated set was for "abstract subjects" (the category of animals) the "rigidity" index of oligophrenic children (31%) turned out to be lower than of normal children of the same age (82%).

The results, give us a basis to seek the key to the explanation of the contradicting behaviour of the oligophrenic child (rigidity in some cases and an easy shift in others) in the laws governing its fixated set the manifestation of which depends to a certain degree on the specificity of generalisation of surrounding reality by the oligophrenic children.

## GRAPHIC SKILLS IN OLIGOPHRENIC CHILDREN

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The graphic habits of mentally retarded children are important for many forms of their working and learning activities.

The experience of schools for mentally retarded children shows that a great many difficulties for younger mentally retarded pupils are due to absence of graphic skills, which in the first place is felt in the learning activities most closely connected with the level of graphic skills, i.e. drawing, writing letters and figures.

Drawing at school occupies a specific place in the development of graphic skills. The share of the propedeutic part of the course of drawing is comparatively big at school for mentally retarded, which gives rise to the necessary pre-requisites for subsequent formation of the pupil's graphic skills: perfects their motor aspect and co-ordination, colour discrimination, perception and analysis of spatial relations (perspective, arrangement of objects and their parts, etc.). Elementary graphic skills are also trained while working with contours, i.e. drawing contours, cutting out pictures, etc.

Frontal activities without consideration for the levels of the pupil's graphic skills are widely conducted at writing, arithmetics, and first of all at drawing lessons in primary forms of special schools.

It seems to be expedient to start systematic graphic lessons at all grades of special school with a frontal experiment aimed at determining each child's level of graphic skills. During the experiment the most severe disorders in spatial orientation, the pathological nature of acquiring rhythmical movements, and other peculiarities, are detected. These data are necessary to divide the children in a form into homogeneous groups according to the level of their graphical skills. The methods of the experiment have been suggested by us, and have been applied many a time.

The data resulting from the experiment, together with those of the analysis of other graphic works by the children, and with the observation material, enable the teacher to correct graphic disorders in children.

## DEVELOPMENT OF GENERALIZATION ABILITY IN MENTALLY RETARDED CHILDREN

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A variant of Brunner's method has been applied in studying the generalization ability in mentally retarded children (debiles): the child was given objects whose characteristic features could be generalized. The children who failed to generalize one or two features of varying complexity, were assisted in that. Mentally retarded schoolchildren of the 1st to 8th forms (10 children from each form) took part in two series of experiments.

Most of the 1st form children (i.e. 6 of them) managed to generalize a concrete feature—the square form of the object. In the 4th form all children succeeded in that. Therefore, it can be stated that ability of generalizing a concrete feature is formed



at the final stage of primary grades. The generalization of a more abstract feature (the existence of two objects) proved to be a far more difficult task. The first to generalize that feature independently were 4th formers (i.e. 2 children), and it was in the 8th form that 90% of the observed pupils demonstrated the ability. This shows that generalization of a visual abstract feature is much more difficult for mentally retarded children, than simultaneous generalization of two concrete features is.

It was not without difficulty that the children generalized two features. While describing the reason for their decision to put the objects in a certain class, the children throughout the experiment stressed one single feature, mentioning the second one only after additional questions. Generalization in mentally retarded children is of visual nature. Having made a correct generalization, the observed pupils often took into consideration outwardly similar, but not general features. Rigidity other words inertia, was observed in mentally retarded children. Thus, they often took stereotype decisions, putting a given object in the same class they had put the first object in.

Assistance to children enabled us to detect the development of the generalization ability in those mentally retarded children who could not generalize independently. When assisted, (a) all 2nd form pupils generalized a concrete feature; and (b) nearly all pupils, starting with the 3rd form, generalized a more abstract feature. Beginning with the 4th grade, all mentally retarded children fulfilled the task of generalizing two features simultaneously.

The research has shown that varying degrees of assistance are needed, for mentally retarded children of diverse age to be able to generalize. The older the child, the less assistance he needs. In development of generalization ability in the mentally retarded child, besides the level of actual development, one can clearly detect the zone of the nearest development (L. S. Vygotsky). The varying degrees of assistance have enabled us to detect two stages in the zone of the nearest development.

## THE FORMATION OF MEASURING OPERATIONS IN MENTALLY RETARDED SCHOOLCHILDREN

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In studying the formation of the measuring operations in mentally retarded children we discovered the most typical defects of this activity. This includes an insufficient generalisation of the knowledge of measures of length, narrowness and inertness of measuring habits, a limited range of transfer and using measuring

habits in changing conditions, a feeble comprehension of their own measuring operations.

The results of the teaching experiment showed that the above mentioned defects in the measuring operations of retarded children can be overcome to a great extent. It is necessary, when teaching to divide the activity of measuring into smaller parts which would be understandable for mentally retarded children. These actions are formed gradually, consecutively and systematically. The difficulties which arise must not be sidestepped, the tasks must become more complicated in accordance with the abilities of the mentally retarded. By this conditions are created to overcome the difficulties by the children themselves and to develop their cognitive processes.

## METHODS OF STUDYING THE IMAGINATION OF MENTALLY RETARDED CHILDREN

M. M. NUDELMAN

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There is not much researches on the imagination of normal schoolchildren, and most of such researches are unsuited for studying the specific features of the imagination of mentally retarded.

When studying the creative imagination of mentally retarded children it is expedient to use "drawings made of a given story". In their drawings, the children recreate forms, colours, and space orientation of objects, which have been mentioned in the story. In cases when the children have difficulty in drawing, they are offered a table game with the aid of which they can illustrate the story.

Another method to investigate the creative imagination is selection of picture, which correspond to the story.

The imagination of pupils planning practical activity can be studied when the children compose plans for forthcoming work. The child must draw one of the objects (a sled, a birdhouse) and then he should tell in detail how he will make it, and he should describe the work, from beginning to end.

An investigation of the creative imagination may be started with a study of how mentally retarded children compile a whole out of parts, how they handle the objects under study and how they mentally transform the images. Various tasks are used to study these forms of imagination: the children work with pictures that have been cut, they build with toys, they finish drawings, they make up stories to one, two or three pictures and think up



an ending for the story. A subject game and dramatisation may also be resorted as a natural experiment.

In the middle and older forms of schools for retarded children there is also the possibility of studying such a peculiar form of the imagination as the dream. For this compositions and talks are carried out on the subject "Whom I want to be and whom I will become", "How I will spend summer vacations", "What three wishes I would fulfil if I had a magic wand" etc. Another aspect that can be studied with such pupils is the ability to take the point of view of another person. This aspect of the imagination can be studied with the aid of a composition and a talk on the subject: "A letter which I allegedly got from another person".

New data have been received with the aid of the above mentioned methods, which expand out knowledge about imagination. Some of the experimental methods could serve diagnostics purposes: to establish the level of development of some forms of imagination, and the general level of development of abnormal children. Experience shows that many of the above mentioned methods are successfully used as games played out of class and help to correct deficiencies of development of the cognitive processes of retarded schoolchildren.

## **STUDIES OF POTENTIAL POSSIBILITIES OF DEVELOPMENT OF MENTALLY RETARDED CHILDREN**

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of Pedagogical Sciences, Moscow*

The teaching process in a special school should be built taking into account potential possibilities of mentally retarded children. Therefore the discovery of conditions promoting the realization of these possibilities is an important line in psychological research.

During the research it has been established that a mental problem containing an element of visualization which can not be independently solved by oligophrenic children may be solved by them under changed conditions. These conditions are as follows: 1) a detailed and full explanation of the way of solving the problem; 2) a special organization of the visual material when the children consecutively solve a number of similar, gradually complicating problems, and thus are brought to solving the problem which has been too difficult at the beginning.

The real development is reached only in that case when teaching is not adjusted to a child's defect but is directed at the realization of all potential abilities of his psychic.

## STABILITY OF ATTENTION OF NORMAL AND OLIGOPHRENIC CHILDREN

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The subject of research was the stability of attention of normal and oligophrenic children. The first series of experiments was based on the recognition and crossing out of the letters C and B from rows of letters (Burdon test). Each pupil was given two tests, with one week interval in between. In the second series the task was the same as in the first, but the difference was that the text made sense. The pupils were from the fifth classes of ordinary schools, and schools for retarded children.

The results showed that the attention of the oligophrenic children was less stable than that of the normal children, in both series of experiments. In the second experiment of the first series the stability of attention increased in normal and oligophrenic children, which was the result of learning which increased the productivity of activity. However in the normal children the quality of work improved because of the reduction in the number of mistakes, while for the oligophrenics it was due to the fact that they read more lines.

In the second series of experiments the stability of attention dropped significantly in normal pupils and remained practically unchanged in oligophrenic children, consequently the sense of the text was not an impediment for the latter.

## MOTOR DISORDERS IN OLIGOPHRENIC CHILDREN

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There are two opinions as regards the reasons for the motoric insufficiency of oligophrenic children. Many investigators explain it by an underdevelopment of the morphophysiological system of the brain, which is linked with the motor functions. In recent years some investigators have taken the view that the motor insufficiency is due to the parietic state of various muscles.

Our research has shown that the motor quality of oligophrenic children improves with age: synkinesis is reduced, the pace of movement is increased, the correspondence of strength efforts in spatial coordinates and the simultaneous movements are improved.

Based on these results we think that the motor insufficiency of oligophrenic children cannot be considered with account being



taken of only the grade of mental retardation, the etiology of peculiarities of the higher nervous activity or paresis of muscle groups. In explaining the motor insufficiency in oligophrenia it is expedient to resort to the theory of the level of movement constructure by N. A. Bernstein, which helps us to understand the multifarious motor insufficiency during oligophrenia and to plan ways of correctional and compensatory work.

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# *Psychology of children with cerebral insufficiency*

## **CONCERNING THE REHABILITATION OF HIGHER CORTICAL FUNCTIONS OF CHILDREN WITH CEREBRAL PALSY**

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The clinical picture of children's cerebral palsy is extremely complicated due to the peculiar combination of residual structural disturbances and of neurodynamic disorders complicating them. The latter appear in connection with processes of growth and development of children suffering from cerebral palsy and also because of inadequate methods of training of these children.

In cases of children's cerebral palsy various disturbances of higher cortical functions take place side by side with motor disorders. Many of these disturbances are discerned by preschool or even school age because the burden of paralyzes does not give often a chance to notice them.

Structural affections of premotor, temporoparietal and parieto-occipital regions, experienced at early stages of development lead to delays and various disturbances in the formation of speech, writing, reading, counting, temporal and spatial notions, other cognitive functions, and praxis as well.

Disorders of higher cortical functions hamper the age development and education of children with cerebral palsy. These children are often regarded as mentally retarded and this creates a serious threat to their social adjustment.

Meanwhile, many of the children with cerebral palsy compensate defects of higher cortical functions just due to their intelligence being intact. Therefore, it is necessary that the doctors working in the field of rehabilitation children's functions compensation were oriented in problems of age development and pathology of higher cortical functions. Parents should also receive serious and detailed instructions in problems of age development of speech, cognitive functions and praxis in children. All the staff of various institutions for children with cerebral palsy must undergo special training.

In special preschool and school institutions for children with cerebral palsy team-work of doctors (an orthopedist, a neuropa-



thologist, a psychoneurologist) with teachers, speech therapists, specialists in corrective physical culture is of great importance. Only the team-work will allow to create correctional-compensatory methods of such children's education and to find out their individual leanings and capacities. In such a way it becomes possible to reach maximum professional adjustment of the children in life in accordance with their abilities, leanings and interests.

It is also necessary to take into account the existence of disorders of inhibitory and excitatory processes in all earlier affected cerebral, especially cortical, regions. Therefore the most favourable background for correctional-compensatory work, as it is established in our investigations, is created only with implication of various drugs of normalizing and disinhibitive action.

### MENTAL DEVELOPMENT OF CHILDREN WITH CEREBRAL INSUFFICIENCY

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Many children with mild cerebral insufficiency do not cope with the demands of the curriculum in the earlier grades of public school. They are unable to acquire the necessary habits of writing, reading and counting within the established time-limits. Such children being no different from healthy children in quickness of wit and personality purposiveness lag behind in their learning due to absence of adequately formed habits. As a result of prolonged lagging behind these children suffer from disturbance of initially adequate self-appraisal, there changes their emotional-voluntary sphere, personality purposiveness and attitude to learning.

However it would be wrong to think that children of this category go through a temporary "delay" in their mental development because their school difficulties have stable rather than transient character.

In our opinion, children with mild cerebral insufficiency suffer from fluctuations of their mental activity impeding in a number of cases formation of dynamic stereotypes. They show poor results not only in the formation of habits of writing, reading, counting and self-control but also in the formation of voluntary attention.

As a rule under the conditions of public school these habits of children with cerebral insufficiency are formed in a wrong way and are difficult to improve. Therefore in teaching a special attention should be devoted to first stages of habits formation

by means of organization of teaching process in a slowed-down pace, practice of all actions stage by stage and strict individual approach to every pupil.

## SPATIAL DISTURBANCES IN CHILDREN WITH CEREBRAL PALSY

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Teaching children suffering from cerebral palsy, especially severe forms, is very complicated and not yet well studied problem.

We studied 50 children 6—8 years old, suffering from cerebral palsy, and we carried out long term speech therapy and instructioning with them.

These children had different kinds of motor defects, as well as defects of speech and other higher cortical functions, which was a serious impediment to mastering academic, daily and work skills.

Our experiments showed that many children with cerebral palsy had spatial defects. During neurological examinations it was discovered that these children had symptoms of disorder of the functions of the left parietal and occipital areas. The children had difficulty in determining the left and right sides of their body, in showing parts of their body. The spatial concepts "right", "left", "up", "down", "front", "back" were not mastered by them.

Usually the children could not make a whole of parts (for instance put together a picture which was cut into parts, put together and take to pieces a simple toy, pyramid). Almost all the children could not build anything out of blocks, and a simple showing of how it is done did not help them, they required special teaching. The children who already knew letters were unable to make them out of stocks or to model them out of plasticine, because they could not put the different elements of the letters together correctly. They put together figures out of sticks by the method of trials and errors.

Disturbances of the spatial analysis and synthesis made difficult the mastering of certain skills of reading, writing and drawing. When writing these children disregarded the lines and did not differentiate the right and left sides of the copybooks. They wrote very inclined letters, started to write from the wrong side, sometimes from any place in a copybook. The same spatial difficulties arose during drawing. In their attempts to read, the children often lost their lines, "jumped" lines.



We used special methods to overcome the above mentioned defects in children. We devoted a great deal of attention to developing notions of space. Formed the ability to express spatial relations in speech. Instruction to develop a fixation of the eyesight in the process of reading and writing and to follow some object, was greatly emphasised.

## A TEACHING EXPERIMENT IN A CHILDREN'S PSYCHONEUROLOGICAL CLINIC

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For studying children in a psychoneurological clinic it is necessary to work out methods of evaluating potential possibilities of a child's development.

We have organized a teaching experiment for which we used modified well-known psychological methods. The children subjected to the test were 7—9 years old. A child was offered a task which is approximately in the "zone of development" of a normal child of his age. In those cases when the child could not cope with the task the experimenter helped him and the help was distinctly defined. The quantity and quality of the help rendered served as a criterion for determination the ability of the child to master a new way of action.

Most indicative results were received in methods of classification of geometrical figures by three features: colour, shape and size. The child had to single out one by one each of these features and to classify objects guiding himself by these features.

The analysis of the experimental data allowed to single out several groups of children differing among themselves by the degree of success in their learning.

Normal children studying in primary forms of public schools quickly solved the task displaying good orientation in a new material. The same success was achieved by normal children having speech disturbances. There were some difficulties for these children in singling out the most complex feature, i.e. size. But the children showed great activity searching for the decision and easily used the help rendered to them.

Children with residual phenomena of organic lesions of the central nervous system could single out the feature of classification but often felt in this significant difficulties because of weakness of attention and heightened fatiguability. Sometimes displaying at the beginning quickness of wit and vividness they became later unable to successfully accomplish the task. They needed much help which had in the main organizing and guiding character (remarks, questions, corrections).

Children suffering from oligophrenia comprised a special group. Even at the initial stage they displayed great passiveness, inability to look for and find the decision. When they were prompted the feature they could guide themselves with it. The transition to the second feature passed with difficulty. Trying to find the new decision the children at the same time constantly returned to the way of distinguishing already known to them. To achieve correct results we had to use detailed methods of teaching and even to show them the features and in every detail to explain to them the way of action. Thus the quality of the "help" was quite different from the help in the previous group.

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# *Psychology of blind and partially seeing children*

## COMPENSATORY DEVELOPMENT OF BLIND CHILDREN

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Psychological-pedagogical and physiological investigations of compensatory processes with pupils of schools for the blind have allowed to find out some regularities of mental development after losing eyesight. The results of experimental investigations of the role of sense of touch, hearing, residual eyesight as well as speech and intellectual functions in the processes of compensation have shown that children's lack of eyesight brings a profound specificity in the course of mental development.

Mental activities of blind children of younger school age are characterized by slowness and unevenness of formation of some functions. For this reason the correct correlation between sensory and verbal-logical cognition becomes disturbed (M. I. Zemtsova, N. S. Kostyuchek, L. I. Solntseva and others). Children confront with difficulties in formation of object and spatial notions, pictorial thinking, concrete meanings of words, etc.

Deviations in blind children's mental development have a secondary character and are overcome in the course of training and instruction. If education (its contents, methods and conditions) is organized correctly, then blind children reveal reserve abilities of compensatory development of auditory, tactile and other sensory processes which constitute sensual basis for the formation of higher forms of cognitive activities (thinking, logical memory, recreative imagination). Under the conditions of education and children's purposive activities there take place compensation and correction of the underdeveloped functions. The compensatory development has a systematic character and spreads on a child's mental activities and personality as a whole.

Technical means of teaching allowing to transform light effects into sound, tactile and other effects. These signals carry information about visual signs and this leads to a significant widening of possibilities of cognition of the surrounding reality and of spatial orientation by the blind (O. I. Alekseev, M. A. Ver-  
M. M. Germanov, R. S. Muratov, M. V. Moshchennikov).

For development of spatial notions, pictorial thinking and recreative imagination great importance has teaching the blind children to make realistic pictures and drawings with the help of special methods (M. I. Zemtsova, Yu. A. Kulagin, I. A. Semévsky, T. R. Roganov and others) as well as teaching them electrical engineering and machine science (M. A. Verbuk, V. P. Yermakov, I. B. Pesin).

Speech and thinking are of primary importance in blind children's compensatory development.

The discovery of possibilities of compensatory development has allowed to ground ways, forms and methods of bringing up, teaching and vocational training of the blind and also to introduce fundamental changes into the system of general, polytechnical and vocational training of the blind on the basis of demands raised by the reality.

## INDIVIDUAL PECULIARITIES OF VISUAL SENSATIONS AND PERCEPTION OF PARTIALLY SEEING SCHOOLCHILDREN

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In studying the age and individual peculiarities of the process of learning of partially seeing children specially important is the investigation of visual sensations and that of perception in these children. In collaboration with N. P. Monich, E. M. Ukrainskaya, and V. A. Feoktistova we carried out experiments on the speed of perception, stability of clear vision, the critical fusion frequency, the dynamics of after images in 80 pupils of the VI—IX forms in schools for partially seeing children.

Experiments showed that the speed of perception is directly proportional to the visual acuity and nature of the disease. The slowest speed of perception was found to be in pupils whose visual acuity is up to 0.1, in pupils whose visual acuity is from 0.1 to 0.2 the reduction of the speed of perception is much less. According to our data, visual acuity of 0.2 is "critical", because if the visual acuity is above 0.2 there are no noticeable disruptions of the speed of perception.

An experimental study of phasic dynamics of clear vision stability allowed us to form 4 groups, which differ in the inter-correlation clear and unclear vision. The first group included pupils whose clear vision was always more stable than their unclear vision, in the second group the clear vision is less stable than the unclear, in the third group there is no noticeable difference the duration of clear and unclear vision. In the fourth group there was no constant interrelation between clear and



unclear vision. We did not discover any direct dependence of phasic dynamics of the clear and unclear vision stability with regard to upon the visual acuity and ethiology of the disease.

Essential individual differences were established when studying the thresholds of the appearance and disappearance of the critical fusion frequency. In the first group the threshold of disappearance of flickering is lower than the threshold of appearance of that in the second group it was the opposite, the threshold of disappearance of flickering is higher than the threshold of appearance of that, while in the third group both thresholds were equal. The individual differences in the level of flicker fusion frequency do not depend on the visual acuity and the nature of eye disease.

In studying the individual peculiarities of the appearance and the dynamics of disappearance of the negative after-image, four groups were established. In the first group the latent period of the appearance of the negative after-image is short and the fading period is comparatively long, in the second group the latency is short and the fading period is comparatively short. In the third group the latency period of the appearance is long and the fading time is rather long, in the fourth group the latent period is long and fading time is rather short. The individual peculiarities in the speed of appearance and fading of the negative after-image does not depend on the visual acuity and the ethiology of the disease. We discovered a direct dependence of the after-image colour, form, and size changes on the nature of the disorder of the functions of the visual analyzer.

The experiments showed that the peculiarities of the phasic dynamics of interrelation of clear and unclear vision, critical fusion frequency and in the correlation of the speed of appearance and fading of the negative after-image, reveal typological peculiarities of the higher nervous activity. The speed of perception and changes in colour, form and size of the after-image, depend directly on the peculiarities of the disorder of the functions of the visual analyzer.

The further study of how the typological factors and factors reflecting the nature of the disorders of vision are revealed in the dynamics of visual sensations and perception of partially seeing children, may be not only of great theoretical, but also of practical significance.

# COLOUR DISCRIMINATION ABILITY IN CHILDREN WITH RESIDUAL VISION

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The colour discrimination function in children has been studied from many aspects—psychological, clinical and physiological. From the special education standpoint it is very important to know volume of that function and its peculiarities in students of schools for the blind, as well as the possibility of using it for teaching purposes.

When studying the colour discrimination it is necessary to take into account three components of visual stimuli hue (colour), saturation and brightness, while in determining the light sensitivity, only brightness is sufficient, as a parameter.

Congenital anomalies of colour vision have been known since the end of the XVIII century, but the peculiarities of the colour discrimination functions in cases of very low level of vision have not been studied as yet. When speaking about people with low vision (the visual acuity of fovea being lower than 0.1) there are mentioned only two forms of congenital achromatopsia (complete and partial achromatopsia with amblyopia, as described by François, 1958).

A study of the defects of colour discrimination during acquired pathology of vision (Rabkin, Kravkov, Dubua-Pulsen, Segal) does not include people with a low residual vision.

We studied the colour discrimination function of children of pre-school and school age with a low shapes vision (mainly with the acuity of central vision being lower than 0.05, and light-sensation with a correct and incorrect light projection) which was conditioned by various pathological processes (64% of them being of a congenital nature).

Research showed that in profound lesions of the refracting medium of the eye (congenital cataract, dimming of the cornea and the vitreous body) the majority of the children in the schools for the blind kept some ability for colour discrimination even when shapes vision was absent.

In contradiction to published data, we discovered normal colour discrimination ability in some children having very low degrees of shapes vision (0.01 and lower).

This circumstance is a basis for seeking ways of using the residual colour discrimination function in teaching and in the working activity of the blind.

In connection with the data received it becomes possible to take on a new approach to the understanding of the mechanism colour discrimination and perception.



## **PECULIARITIES OF SPEECH DEVELOPMENT IN BLIND PRIMARY SCHOOLCHILDREN**

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Speech is the leading source of cognition of the surrounding world for blind children, which to some extent compensates the deficiency of their sensual experience, and provides for a normal development of their intellect.

Since verbal communication of blind children is not affected, the grammatical structure of their speech develops normally.

Along with that, certain peculiarities are characteristic for the speech of blind children, i.e. insufficient concreteness of their vocabulary, in the main. Blind children acquire from their verbal communication and actively use a great number of words denoting the objects, phenomena or situations they have not experienced directly, have no idea of, or imagine partly. Therefore, a discrepancy arises between the vast vocabulary, the blind child possesses, and the insufficient number of object's images at his disposal. Such children understand many words nonadequately, which sometimes leads to formal assimilation of knowledge by them.

When with the growth of the vocabulary of blind children their cognitive and independent practical activities, providing them with diversified impressions about the surrounding world, are organised systematically in conditions of special education, the peculiarities of their speech development gradually disappear, or even do not arise at all.

## **PECULIARITIES OF TACTILE COMPARISON IN CONSTRUCTIVE ACTIVITIES AFTER A MODEL IN BLIND CHILDREN OF PRE-SCHOOL AGE**

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Tactual comparison plays an important role in the blind child's constructive activity after a model. It helps him check whether his actions are correct.

The hands of the blind child carry out consecutively practical and perceptive actions, i.e. performing activities have to be interrupted in order to make comparison.

On lower levels of constructive activity development, children make no use of the model.

We can consider prior classification of parts necessary for constructing something after a model, and simultaneous concentration in child's hands all the parts of a structure, to be an important pre-requisites for the development of consecutive comparison.

Actualization of images of the model perceived earlier, is significant for the development of tactual comparison. Here the comparison process is effected through comparing the parts of the structure perceived tactually, with the idea about the place of the parts in the entire model. The comparison grows easier when the child while examining the model understands the principle of connection of its parts. Blind children of pre-school age achieve such understanding while analyzing the model practically by its disassembling.

Tactual comparison in pre-school age children with normal vision can be achieved earlier than in blind children. The former, on their own initiative, use the model to check up their actions.

### MEMORIZING PECULIARITIES IN PRIMARY GRADE PUPILS WITH VISION DEFECTS

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Visual disorders in children hinder the normal development of their cognitive activities.

We have conducted a comparative study of accidental memorizing of visual material by 1st to 4th grade pupils with defects of vision or without them, during active work, i.e. classification of the objects on pictures.

Specific peculiarities have been detected, characteristic for accidental memorizing of visual material by pupils with visual defects. The pupils experienced difficulties in classifying drawn objects, due to lack of clarity of perception, and insufficient differentiation of the perceived features of the objects. Accurate, lasting images of the objects perceived were not formed in the pupils, and that negatively influenced the process of their memorizing.

The productivity of memorizing and reproducing visual material was lower in children with visual defects, as compared with that of normal children. Despite of a rapid increase in memory productivity in pupils learning in the 1st to 4th grades, those with vision defects still lag behind normal children of the same age.

The research has shown that visual defects exert negative influence not only on perception, but also on other processes of cognitive activities, and particularly on memorizing and reproduction.

# THE COMPENSATORY SIGNIFICANCE OF TECHNICAL AIDS FOR ELECTRICAL MEASURING IN THE SCHOOL FOR THE BLIND

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The principle possibility of the blind to fulfill independent measurements which require visibility, is created owing to the use of technical means, based on the use of intact analyzers (auditory, tactual, and motor).

Our experiments have shown that the best compensatory effect during electrical measurements requires not only the reequipping of the usual devices with hands and continuous scales (work by R. S. Muratov, M. A. Verbuk, N. V. Moshchenikov and others) but also the use of discrete methods, under which the value measured is taken at the nearest fixed value. The unavoidable error which will result in this system may be made sufficiently low, by increasing the number of fixed values in other words by reducing the discretion. The devices with discrete chain links completely remove the error of value reading, which depends on the subjective peculiarities of perception and which is unavoidable in devices with an continuous scale.

Keeping in mind the above mentioned remarks we, in conjunction with engineer V. P. Morozov, worked out and tested a discrete electroacoustic voltmeter for the blind (patent rights USSR No. 162588, of 8th April 1963). In this device, the balancing moment is signified by a minimum height of sound, and the count by a scale with step values. The scale is made according to the Braille method with embossed gradients, which are duplicated by flat large contrasting figures (for use by children with residual vision).

An experimental test of the voltmeter in schools for the blind showed that it is not worse than the typical devices of analogous purpose, used in the practical work in ordinary school and in production. At the same time it is quite suitable for independent work by the blind during various electromeasuring work in schools for the blind, when they study physics (section of electricity), electrotechnique and so on.

The use of the discrete voltmeter and analogous devices to measure other electrical values (amperemeter, ammeter etc.) allow us to enrich the content of polytechnical education in the schools for the blind and makes it possible for pupils to be trained for specialities in modern production which are completely new to them.



# BIOTELEMETRY IN STUDYING PHYSICAL DEVELOPMENT OF BLIND CHILDREN

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Blindness exerts a profound influence on children's physical development. It is significant to find any peculiarities of reactions of the central nervous system and other organs in blind children under physical load. We have applied biotelemetry to record reactions of the cardiovascular and vegetative nervous system in blind children making physical exercises. The radiotelemetering installation of our laboratory with a transmitter and receiver has been used of recording the heart rate, the length of the support in walking, running, and during physical exercises.

It has been found that already with slight physical loads, (i.e. walking, running, jumping, throwing), the excitability of the vegetative nervous system in blind children increased, and there was a drastic jump in the heart rate, which testifies to the organism's great energy expenditure during physical exercises.

Analysis of the data obtained enables us to judge about the maximum level of the physical load at physical training lessons and at sports training sessions in blind children.

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# *Psychology of the deaf and hard of hearing children*

## THE SENSORY BASIS OF LIP-READING

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The following questions have to be cleared up to discover the mechanism of reading: a) what is the sensory basis of perceiving information by means of lip-reading; b) what relations are formed between the visual and motor-articulatory analyzers in the process of lip-reading.

A comparison of the data on visual perception of sounds and the scores of articulation of speech in a telephone and radio leads to the conclusion that the sensory basis on which the process of lip-reading is based, is insufficient to perceive verbal information.

The nature of concrete substitutions of sounds of speech in the process of lip-reading, testifies that their choice is conditioned by the peculiarities of the motor-speech analyzer. The sounds which are the easiest to pronounce take the role of universal substitutes in the groups of optically similar sounds. The sounds which are harder to pronounce perceived as similar.

One ought to suppose that lip-reading includes the mechanism of scanning. In this mechanism the role of scanner belongs to the motor-articulatory analyzer. Due to this, sounds, the articulation of which is hidden from the eye sight, become easier to distinguish and the optical by similar sounds are differentiated.

## PECULIARITIES OF SPEECH THINKING OF DEAF CHILDREN

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As applied to investigations of the deaf's thinking the differentiation of concrete practically-effective thinking on the one hand and verbal thinking on the other is a matter of principle. Of course, neither of these forms of thinking can take place without the other. Verbal generalization participates in concrete

thinking operations and vice versa. There can be no verbal thinking without any concrete and practically effective operations.

Early deafness impeding normal speech development creates conditions under which a child's concrete thinking develops relatively independently from verbal generalizations.

Special experiments and numerous observations of the behaviour of the deaf who have not yet mastered speech and also studies of their capacity to master relatively complex trades convince psychologists that concrete (practically-effective) thinking in the main is within powers of deaf children before they master the language.

In our investigation we use the notion of verbal thinking suggested by L. S. Vygotsky who wrote that "it is in the meaning of a word where there is a center of the unity which we call verbal thinking".

Our studies of verbal thinking of the deaf children who are for the first time in their life master the language under the conditions of special teaching are based on the analysis of originality of words meanings with extremely limited practice of speaking which deprives a child of possibilities to reflect in full the reality with the help of verbal generalizations. The material for investigations consists of independent oral and written stories made by children on a number of subject pictures. The work was conducted with pupils of schools for children with ear defects (deaf and hard of hearing children).

One of the productive methods for the analysis of meanings of words and grammatical forms in deaf children's verbal speech is their comparison with the meanings typical for the early level of development of facial-gesticulative speech. According to observations, facial-gesticulative signs and the peculiar syntax of the facial language reflect especially visual character of thinking of the deaf who have not yet mastered speech. This situational visual character of thinking determines ways of their usage of words and grammatical forms for independent verbal expression of their thoughts.

Concrete character of verbal speech thinking of the deaf is characterized by peculiar polysemy (by analogy with the facial sign) and "loquacity". Whereas the "polysemy" reflects extremely wide, diffused word meanings, the "loquacity" is the result of scantiness of speech generalizations with deaf children. The peculiarity of the deaf's verbal thinking is reflected not only in the meanings of words but also in the grammatical structure of their speech. Such underdevelopment of the deaf's verbal thinking prevents them from mastering the fundamentals of science.

The meaning of words are developed in the process of special teaching language to the deaf. This by the way is reflected in simultaneous development of mimic speech. Its signs also



acquire increasingly generalized and abstracted character. In the course of special teaching children learning verbal speech compensate their inferiority in communication and develop an ability to make language generalizations constituting the basis of verbal thinking.

## THE USE OF DEVICES PRESENTING ORAL SPEECH IN VISIBLE FORM AS MEANS OF COMPENSATION OF DEAFNESS IN TEACHING LANGUAGE

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At the contemporary stage of development of methods of teaching the deaf to speak orally, special technical devices have gained great importance. They are aimed at helping to compensate the impaired hearing by the use of intact analyzers.

Among such devices are ones that transform the sounds of speech into visual signals. Among the Soviet made machines of this type are the VIR ("visible speech" and DVIN (double-filter visual indicator), designed and built in the laboratory of technical aids for the deaf at the Institute of Defectology.

The above mentioned devices were tested in the following two ways. At first with the aid of imitations of various defects of the voice and phonemes, we appraised how expressed the difference was between the normal and defective pictures on the screen. Then we experimented in correcting the phonetic defects of deaf pupils of various ages with the use of these devices.

As a result of the experiments we established that some of the pronunciation defects are easily defined on the screen of the VIR, others are less defined, while still others cannot be seen at all. From defects of phonemes the best seen are those, which connected with the wrong reproduction of consonants and are caused by deflections in the use of the voice and disorders in the way of articulation. We can easily see any deviation in the consecutiveness of sounds combinations. However the defects of the voice are not sufficiently defined in the visual presentation.

On the screen of the DVIN we see the more rude deflections in the reproduction of the vowels, in particular, when one sound is uttered almost like another one (for instance, i and e, u and o, etc.).

The DVIN construction allows to reflect only those consonants which can be pronounced protractedly. On its screen we can easily define the defects in the pronunciation of such sounds as s, š, z, ž, l, m, n, r. Since the DVIN in difference to the VIR does not have the temporal scanning of signals, therefore it cannot

be used to detect specific defects in the pronunciation of words. But it is possible easily to see on the screen certain defects of the voice.

Experiments in the correction of pronunciation with the help of VIR and DVIN were carried out on several groups of deaf schoolchildren from 8 to 17 years, as well as on three adult deaf people.

The subjects were chosen on the basis of their pronunciation and with account being taken of the possibility of reflecting their speech defects on the screens of the devices.

The methods of work included a comparison of the patterns corresponding to the teacher's pronunciation (the correct sample) and those of the pupil, the fixation of the difference in patterns with the aid of schematic charts, and independent attempts of the pupil to "come as close" to the proposed sample as possible. When necessary additional methods of the usual primary correction of defects were used. Having attained the correct pronunciation of a certain element, the children had to remember its picture on the screen. The further consolidation of what was learned took place by means of independent training based on visual "feedback".

The experiment showed that these devices can be successfully used for consolidating a corrected pronunciation, and in some cases for primary correction of defects. Catching easily the differences and the similarity of the pictures on the screen, the pupils can independently appraise the quality of the pronunciation both their own and that of their comrades. Owing to the visual feed back in the exercises with the devices there were much fewer cases of "sliding" back to defective pronunciation and that the percent of self-corrections of errors grows highly.

The use of these devices helps to raise the awareness and activity of the pupils during the process of mastering the habits of pronunciation, and brings forth a stable interest to the lessons.

## COMPARING OBJECTS BY DEAF AND NORMALLY HEARING CHILDREN

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In the years of childhood great changes take place in the intellectual activity of a child in the process of mastering comparison as well as understanding interrelations of different objects by comparison. People engaged in pedagogical activities have to solve a number of widely different problems at various stages of

a child's development. Not all of the children who enter a special school are able to compare somewhat complex objects. Far from it. Schoolchildren face a lot of difficulties trying to build up a unified conceptual system out of two objects, a system which would have the necessary stability required for the process of comparison. If it is achieved a new difficulty arises which boils down to the fact that schoolchildren find difficulties in the process of making a comparative analysis of objects which belong to a system.

Feature distinction cannot be explained by the traditional concept of sensual abstractions which lies in the recognition of the positive influence of abstraction on one set of features and its negative influence on another set of features. It is found that depending on the category of a feature the task of singling out this feature calls for some kind of conceptual operation. Those features which belong to the object as a whole call for a sorting out method which differs from the method of distinguishing features which belong to the parts of an object and still another method is needed to distinguish parts of parts (or particles). At the earliest stage of a child's development its usage of the operation of distinguishing features of a certain category depends to the highest extent on the character of an object. It is found that so far as complex objects are concerned the process of learning their qualities goes slower than the process of distinguishing their parts and that the qualities of an object as a whole are learned later than the qualities of its parts. The dependence of feature distinction process on the character of an object is reduced in the process of development.

Application of distinction operations in the process of comparison goes through several phases. Every new phase is not only widened in its scope by new operations; it is marked by some new progress in the sphere of application of acquired operations in somewhat more difficult situations. One of the early phases is characterized by certain supremacy of the action operation. The process of comparing features is defined in the first place by a distinction operation which singles out a feature of a certain category. For instance, parts of two objects are compared but not the corresponding ones. In the next phase false comparisons disappear but dependence on this very operation is still strong, and is expressed in the fact that children compare only all the features of the only category which corresponds to the actualized operation irrespective of their place and meaning for the objects. When these features are exhausted the above mentioned operation gets ousted by another operation which serves another category of features. Along with this all the features of this particular category appear in their turn, etc. In the third phase dependence operation becomes weaker, the process of actualization and substitution of operations submits itself to the guidance of



rules defined by the structure of objects taken for comparison. With this a new phase comes at last. In this phase application of operations is guided by the dominant rule which lies in the importance of a feature in the real correlation of objects as they are.

The process of learning relations among the same objects undergoes certain changes within the period of a child's development. During preschool age children begin to consider as being different those objects which were recognized by them at a certain phase of development as being similar while of school age these objects are recognized as being alike. We can distinguish three following stages in the process of a child's development: similarity, difference and likeness. The definitions of the above mentioned stages are, no doubt, completely conditional. Deaf children as well as normally hearing ones pass through the same stages of development though their stage of similarity is somewhat more prolonged; their stage of difference is manifestly expressed and their stage of likeness is formed relatively slowly.

Relations of similarity contain in themselves particular qualitative relations of a singular type. Relations of difference have other qualitative relations and they are again of a singular type. Likeness is learned as a complex relation including a number of different types of particular relations (e.g. identity of these features, resemblance in another set of features, commonness in the third set of features, peculiarities in the fourth set, differences in the fifth one, etc.). Totality of specific relations of features of similar objects forms a structure whose qualitative peculiarity depends on the objective likeness of objects. Thus the structure of interspecific likeness is so peculiar that it is conspicuously different from the structure of intraspecific likeness on the one hand and from the structure of intergeneric likeness on the other hand.

Gradual understanding the multiformity of the particular relation's types which isolate themselves one from another inside likeness relation between objects in general and mastering qualitatively different likeness structures are rather difficult processes with deaf schoolchildren. It is absolutely important to pay considerable attention in schools for deaf children to teaching them how to learn likeness and its basic structures since with the help of this we bring them closer to perceiving the substantially common signs features in objects and consequently we make it easier for them to master conceptual generalization. The principle of comparison which is highly praised by didactics deserves more elaborate study in the sphere of education of the deaf. This will no doubt improve the process of teaching the deaf.

## DACTYLIC SPEECH AS MEANS OF COMPENSATION IN TEACHING OF DEAF CHILDREN

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Teaching deaf children to speak is performed with the obligatory use of various compensatory means. With the oral system of teaching compensation is achieved through vision, tactile-vibrational and kinesthetic sensibility. However the use of all these types of sensibility is not sufficient for teaching deaf children to speak. Speech movements do not provide for a sufficient control of the articulation and therefore some additional "feedbacks" are necessary.

The research carried out at the Defectology Institute has shown that a serious factor of compensation is represented by the use of dactylic speech and by the use of muscle sensations of the moving hand.

Using dactylic speech a deaf child masters the language as means of communication much quicker and with greater success. From the very first days of studying at school children begin to communicate between themselves with the help of verbal means.

It is established in our research that mastering of dactylic speech does not impede reading from the face. Due to dactylic speech vocabulary and phraseology increase greatly, the speech is actively used in communication. All this increases possibilities of speech perception by reading from the face. Dactylic speech does not impede teaching the pronunciation. On the contrary during the first year at school a close interaction between dactylic and oral forms of speech is established and a single neurodynamic system arises. As a result speech material assimilated in the dactylic form at the beginning becomes the property of oral speech.

## INDEPENDENT WRITTEN SPEECH OF YOUNG DEAF PUPILS

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The peculiarities of independent written speech of young deaf pupils were studied. We analysed compositions written without any assistance by pupils of the II—IV forms of schools for deaf children describing the contents of some pictures or events in their lives, as well as compositions of pupils of II—III forms of ordinary schools on the same subjects.

In the majority of the compositions of the deaf pupils the situation was far from fully conveyed. About 80% of compositions of these children reflect the situation only partially or fragmentarily. In these compositions the mere fixation of facts prevailed and almost no interpretation was given. Sometimes unfounded additional remarks were included.

When writing their compositions, the deaf children most often (in accordance with a resemblance to some side of the shown material) use words already known to them. It is hard for these children to select the necessary information, and to think over the order and form of the composition. As a result they often replace the given task by something more usual to them and more elementary. The following shortcomings were found in the compositions of the deaf schoolchildren; 1. Misuse of words and wrong sentence construction. 2. Disproportion of the parts (the same amount of space is allotted to important information as to secondary, and sometimes even less). 3. Missing of essential information and inadequate inclusions. 4. Lack of the necessary link between parts and the complete sense of the composition. 5. Disregard to the logics of development.

The compositions of the deaf pupils were worse than those of normal children as far as proper use of words and sentence construction are concerned (68% of the mistakes made by the deaf children were mistakes of grammatical connection between words). The description of the situation was not as consequent differentiated, and generalised in the compositions of the deaf pupils, than in those of children with normal hearing.

The data received testify that complications of the task may partially account for the shortcomings of the compositions of deaf children. But in our opinion these shortcomings are mainly due to the fact that the deaf children are unable to compile a developed opinion. Comparing the compositions written according to one and the same assignment by pupils of the same school form, but from different schools, we can notice a considerable difference in the vocabulary and phraseology of the compositions, depending on the pedagogical process.

Special experiments have shown that the written speech of young deaf school children develops noticeably better if they have the general abilities which allow them to construct phrases of various types and create the necessity in written expression of their ideas.

Therefore we may consider that the level of the development of written speech in deaf pupils may be significantly improved as compared to the one achieved in the majority of schools at present.



## THE PACE OF THE PRACTICAL ACTIVITY OF THE DEAF

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Recent research has shown that deafness brings on certain peculiarities in the course of a number of psychic processes. In particular, such a peculiarity is the slowing-down of actions of the deaf.

A study of different types of activities showed that the speed of motor reactions (J. E. Shif, 1957; A. O. Kostanyan, 1963) is slower in deaf children than in normal children. This slowing down was observed when certain actions had to be carried out, which were connected mainly with solving mathematical and logical problems, as well as when various complicated motor (work) processes take place, including those which involve mainly stereotype movements. The slowing down was highly pronounced during the start of some new activity and when fatigue set in (a study of the work of deaf people in production). In normal people under similar conditions we often observed just the opposite: tiredness caused acceleration, hurriedness of action.

The slackened pace of the activity of the deaf may, to a certain extent, be explained by the fact that some of the tasks were too difficult for deaf children. However in the majority of cases it is possible to assert that the slowing down in the deaf is also caused by a specific features of development of their motor sphere. The loss of hearing, one of the most important means of acquiring information, somewhat limits the process of reflection of own actions and makes the process of correction of these actions less precise and rapid. The latter, apparently, in turn influences the speed of the actions being carried out. Because of this on the basis of previous experience the deaf work out slackend paces of activity.

Hence the slowing down of actions of the deaf is in origin a secondary phenomenon, arising as a result of deafness. Teaching helps to level out to a significant extent the difference in the pace of activity of the deaf and normal.

## FINGER SPELLING AS A CONDITION OF FORMING VERBAL COMMUNICATION OF PRE-SCHOOL DEAF CHILDREN

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A deaf-and-dumb child can master oral speech only after special training in pronunciation and lip-reading of those words which he has learned earlier. This kind of teaching is complicated,

it requires much time; as a result speech formation and development of verbal thinking in deaf children are greatly delayed.

Even the best teachers of the deaf experience shows that possibilities of development of deaf pre-school children are not sufficiently realized by teaching them only oral speech.

We began to teach deaf children of two and a half years of age using the finger spelling ABC in combination with the oral method of reduced system of phonemes; we managed to achieve that by the end of their staying in a pre-school institution these children mastered the meanings of two thousand words. These increased possibilities of a deaf child's development appeared due to the fact that visually perceived finger spelling provides for accurate analytical perception of a word and for its mastering by way of imitation. This method allows to master speech not only by way of special lessons but also on the basis of immediate communication with the help of finger spelling.

### PECULIARITIES IN THE FIXATED SET OF DEAF SCHOOLCHILDREN

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We studied the peculiarities in the fixated set of deaf schoolchildren (from 9 to 19 years old—87 children). We carried out tactile and visual perception experiments.

The fixated set of deaf children from 9 to 13 years of age turned out to be very excitable (appeared easily), static and stable. In experiments two circles or two balls of different size were given to subjects for comparison. Having perceived these objects two times the children, in following critical experiments, considered equal objects as unequal (stability of set). This acquired set prevailed for months, i.e. was stable.

Changes in the fixated set was observed in deaf children from 14 years of age: for the first time a dynamic form of the extinguishment of set appeared. The dynamic set was discovered in more than a half of the children of 15 years old, and it was most typical in children of 16—19 years old.

The results show a peculiarity in the fixated set of deaf children. In normal children, the dynamic set appears when they are 9—10 years old, while in the mentally retarded children the static nature of set remains throughout their school age.

The changes in the fixated set in deaf children from static to dynamic form reflect the changes in the psychological processes, which occur under the influence of upbringing and teaching. The fact that the set of the older deaf school child acquires dynam-

city, signifies that he has acquired the possibility of discarding the influence of fixated set and to switch to a new one, to overcome the rigidity of his set and to develop his behaviour in correspondence with the given existing conditions.

## DEAF SCHOOLCHILDREN'S THINKING ACTIVITIES WHILE SOLVING ARITHMETIC PROBLEMS

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It is well known that due to peculiarities of deaf children's speech development their reasoning ability develops slowly and with great difficulties. The peculiarities of development of their ability of reasoning manifest themselves in the process of solving arithmetic problems.

As it is proved by our experimental investigation many deaf pupils of middle forms of secondary school while solving arithmetic problems resort to routine methods based on isolated connections between phenomena. Owing to this, in many instances they solve the problems in the wrong way because the correct solution requires to take into account various connections and relations of both object and arithmetic character constituting contents of the problem.

If the deaf children are taught in the wrong way they develop a habit for stereotyping and simplifying problems and the lack of flexibility in their doing arithmetic actions tends to consolidation.

As a result of the investigation it has been established that many deaf children experience great difficulties in mastering arithmetic actions as true generalizations of the object reality. To make a child to master high levels of generalizations on which arithmetic actions should be based it is necessary that he knew to operate with verbal generalizations. However deaf children often happen to have them still insufficiently developed.

Many deaf children often lack strict inner logics of solutions in accordance to which each stage of the solution should be very closely linked with previous and subsequent stages by mutually inversed connections. On the contrary, separate stages of solving problems by deaf children are often united only by connections which are formal in character relative to the contents of the problems.

Deaf schoolchildren make with great difficulty the transition from the object effective situation to the arithmetic solution and from the solution to the practice.



In the process of training in middle and senior forms of secondary schools (IV—XI forms) deaf children make a great progress in the development of their thinking activities which manifests itself in improving ways of problems solution, in establishing greater continuity between stages of their solution as well as in forming greater variety of connections between the solutions of arithmetic problems and object-practical situations.

The practice of teaching deaf children to solve arithmetic problems turns out to be effective if the following three main stages of teaching are observed: 1) propedeutic lessons when the children form the notions based on generalizations of object-quantitative relations; 2) the proper solution of arithmetic problems during which the degree of understanding by the pupils the object relations of the problem and their ability to express them in the language of arithmetics are of great importance; 3) the usage of knowledge in arithmetics for solving practical problems. Teaching arithmetics for the deaf is successful only in those cases when the teacher thoroughly considers all stages of mastering knowledge taking into account the fact that as a rule the deaf makes up a deficiency with great difficulty due to limitations of their verbal communication.

## ON FORMATION OF GEOMETRIC CONCEPTS IN DEAF CHILDREN

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We studied knowledge and ideas of deaf children about plane geometric figures. Three series of experiments were run. At the beginning of each series the subjects were to answer the question what figure they would call a square (series 1 and 2), and rectangle (series 3). Then in the first series the subjects were asked to find a square among a number of plane figures (a square, two rectangles, which differed from the square by the length of their sides, and a hexagon). The only difference of the second series was in the set of figures to choose from. They were a square, two rhombuses with the side equal to the side of the square, and an equilateral triangle. In the third series the children were to distinguish a rectangle between two parallelograms and a trapezium.

The subjects were deaf schoolchildren from grades 4, 6, and 8, and normal children from grade 4.

The results say about difficulties of formation geometric ideas and concepts in deaf children. Not all the children, even from the upper grades could characterize correctly the features of square and rectangle. It was only in some single cases that

deaf children, even in grade 8, could give definitions reflecting essential features and properties of geometric figures. The children often mixed up the names of the figures, did not understand correctly, of what elements a figure consisted. In some cases wrong generalizations were caused by superficial similarity of geometric terms. We did not observe such mistakes in children with normal hearing. Deaf children often made mistakes in choosing figures out of a number of similar ones, took some figures for other ones, etc. A comparison of how the children described figures and made their choices shows that only few deaf children used their knowledge about figures in the process of choosing them.

## THE MASTERING OF PRIMARY NATURAL SCIENTIFIC CONCEPTS IN HARD OF HEARING CHILDREN

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The peculiarities of the development of speech in hard of hearing children determine the specificity of their learning process and formation of generalisations.

The primary natural scientific knowledges are acquired by hard of hearing children at object-lessons (I—III grades) and at propaedeutic course (I—VII grades). By special experiments we discovered some specific features of generalisation on which the hard of hearing children form when studying natural science (IV—VII grades). We based our work on data obtained by R. M. Boskis and Zh. I. Shif when they studied deaf children.

The replies of hard of hearing children usually based on situational generalisations, they are very diffusive, and include a whole visual situation. For instance they call flowers "garden", a group of trees "forest" etc. Besides this widespread diffuse generalisations the hard of hearing children have also obvious narrowing of the volume of concepts. For them only mammals are animals, and plants include only trees or flowers. Apparently, the meanings of the words "plants" and "animals" are not generalised enough, and therefore the concepts corresponding to these words are poor in their contents.

The results show, that in the process of mastering of concepts the hard of hearing children find it difficult to differ them as to the degree of generalisation. They place in one sense group, which words are more and less general in meaning (for instance the words, "flowers" and "rose", "tree" and "oak", "woodpeckers" and "bird"). This equation of words which are of various degrees of generalisation, leads to the fact that the system of corresponding co-ordinate concepts are replaced by simple row of concepts.

Difficulty in mastering even more general concepts is manifested also when the children find words of a smaller degree of generalisation for a group of animals or plants, instead of just one word. For instance they do not unite the aspen, apple tree, poppy, cucumber into the concept "plant", but divide them into the following: asp-tree, apple-tree fruits, poppy-flower etc. The general concept of "plant" is replaced by several individual concepts. The same occurs with the generalising word "animal".

There are more difficulties in mastering of general concepts because they have to be based on a more abstract features of objects. Developing of concepts of natural science, depends on the degree to which the meaning of words is grasped. Many words corresponding to natural science concepts turn out to be poorer to their content, and not sufficiently differentiated in meaning (into general and individual, into the more abstract and more concrete). The generalisation which is formed often turns out to be diffuse, and the general concepts is sometimes significantly narrowed in volume, and the logical and semantic co-ordination is disrupted. All this leads to an incomplete mastering of knowledge.

#### COMPREHENSIVE STUDIES OF PRE-SCHOOL AGE CHILDREN WITH HEARING DEFECTS

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Elaboration of methods of assessment and prognosis of possibilities for teaching and development of pre-school age children with hearing defects, is a pressing task facing special psychology and defectology.

In a number of cases the development abnormalities are quite complicated, since deafness can be accompanied with other defects. Therefore, one of the research tasks consists in isolating the lesions of the auditory analyzer and their consequences, from the defects having no causal connection with the loss of hearing.

The very hearing impairment, or total deafness, together with the absence or subnormal development of speech, call forth a number of peculiarities of the child's psychological development. Therefore the necessity arises in a structural characteristics of the defect, and in compiling an age characteristics of the pre-school age child with hearing defects. We take into consideration here, that the development tendencies are common for the deaf and normally hearing children. With years, the deaf child (or the child with hearing defects) masters social experience, and does it even without specialized schooling, while given the latter,



his development comes ever closer to that of the child with normal hearing.

We are interested in assessing the child's development process not only quantitatively, but also qualitatively. In order to study the structure of the defect, it is not sufficient to witness the result of the child's solving a given task; one should analyse his actions in the process of solution: i.e. the methods and operations he has mastered, and to what extent, as well as the degree of interiorization of corresponding operations.

Observation of a child starts with examination of his hearing, the level of speech development, and state of his vestibular apparatus. Due to the fact that there is a direct connection between the hearing and vestibular abnormalities on one hand and defects of space perception on the other hand, the latter are studied as well.

Deafness or severe hearing impairment breaks the normal forms of communication (i.e. speech), influences the mental processes quite distant from the primary and secondary defects. Therefore, (a) the child's visual perception; and (b) his intellectual processes (i.e. concrete thinking, serialization and classification, and reconstruction of the whole) are also studied, as well as his behaviour, and his personal attitude to activity. In a number of cases, the child's failure to solve certain problems can be entailed by the peculiarities of his attention, or absence of motives, etc.

Such comprehensive studies are to be conducted by specialists in diverse fields: otolaryngologist-audiologist, psychologist, special educationalist. Also of importance are consultations of speech therapist, electrophysiologist, psychoneurologist, and ophthalmologist. The data collected by them are discussed by the whole team for each child, and his general characteristics is drawn up, defining the possibilities for his further development, and the necessary forms of pedagogical influence (with full utilization of his intact and affected analyzers, and compensatory development of his entire personality).

## **PSYCHOLOGICAL ANALYSIS OF THE INFORMATION OF PRODUCTIVE MOVEMENTS OF THE DEAF AND NORMAL STUDENTS**

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The formation of labour activity in the deaf children, as psychological research has shown, has its own peculiarities. Gorzova noted the slow pace of labour activity of the deaf

schoolchildren, E. E. Finkelstein noted the slowing-down of labour activity of the deaf workers, who graduated from special schools. The deaf often have irrational methods of carrying out labour operations, which leaves a certain imprint on their productive successes. In connection with this of special significance is the study of the labour activity of the deaf from the point of view of psychological structure, the study of the formation of working habits methods and organisation of vocational training of the deaf students.

Experimental research has shown that the mastering of productive operations and in particular, auxiliary operations is harder for the deaf for than the normal.

The deaf students did not realise fully the significance of auxiliary operations. They did not put themselves the aim of fulfilling them in the best possible way. The deaf students did not work out rational system of actions. They mastered the most economising and improved methods worse than the normal, and did not resort enough to the possibility of combined actions. Control over the fulfilled actions was mainly carried out only visually. All this led to the fact that the deaf carried out the auxiliary operations more slower than the normal pupils. Because of the instability of their activity a significant fluctuation was noticed in the time it took them to fulfill the auxiliary operations.

The formation of professional skills and habits is closely tied with the organisation of the training process, in which the carrying out of labour actions to a great degree depends on their aims. To study this problem an experiment was carried out, in which the auxiliary operations were given as much attention as the main operations. The constant attention of the students was called to the auxiliary operations, and this caused a significant influence on the result of the work. The purposeful aim changed the nature of the labour actions of the deaf. They paid more attention to the question carrying out the auxiliary operations when the task was explained, and also during the independent preparation to the work and during the work itself.

As a result they showed more effective methods and actions of work and an accelerated pace of work. The realisation of the difficulties in the work and the ways of overcoming these difficulties helped the students to avoid extra, unexpedient actions and mistakes, which caused loss of productive time. Gradually the carrying out of the auxiliary operations became more precise, economical and the indices of these operations came closer and closer to those of the normal children.

If the deaf workers are to keep pace the constantly growing requirements of production, we must raise the level of their training as a whole, starting with the general educational schools, and including the vocational training in special educational

Institutions. One of the important tasks is the improvement of carrying out the auxiliary operations, which cause an essential influence on the level of productive labour.

## THE PLANNING BY THE DEAF CHILDREN OF THEIR PRACTICAL ACTIVITY

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Planning plays an important role in the structure of human activity. Therefore we conducted special studies of how the deaf children plan their own practical activity.

The experiments showed that the majority of the deaf school children (even in the primary forms) can plan their practical activity. Only 4 out of 39 children who took part in the experiment could not plan their activity. Some peculiarities of planning were noted. Only some children (4 out of 78) were able to plan their activity in full, the overwhelming majority (69) planned it only partially. The deaf pupils used their linguistic knowledge very little. We did not observe planning which was expressed only in verbal form. Most often they used mimic and gesticulatory form simultaneously with verbal one. As a rule the words used by the children were separate and not connected words. The main load in planning fell to gestures. A significant part of the children planned their activity only with the aid of gestures (27 children).

According to the conditions of the experiments the children gave reports about their activity after it was completed. These reports showed the practical activity is of extreme importance for actualisation the knowledges of verbal material. All the children were able to fulfill their assignment in compiling their reports. Only about a third of the children (24 children) were able to describe their activity using only words (there were no such cases at all when they plans their activity). The number of pupils who used both words and gestures was less than when planning (37 cases), and the number of cases using of only gestures was even less (17 cases). Moreover in the reports about the fulfilled activity, verbalization was much better both in volume and in the structure of sentences.

The peculiarities of the planning by deaf children discovered in the experiment are determined to a great extent by the system of upbringing and teaching in the school for deaf children, where the verbal methods prevail without sufficient use of the practical activity of the children themselves. At present the teaching process does not greatly promote the development of the activity and independence of the pupils, the formation of habits to plan their own activity. More attention is paid in the schools to the



verbalisation of what the pupils already did, what they were able to see in the pictures, in everyday situations etc. At the same time it is necessary to teach the children to foresee the forthcoming work and plan it in verbal form. Moreover we must not forget the problem of the formation of proper motivations and its important prompting role in their activity.

## DEAF CHILDREN'S MENTAL ACTIVITIES IN THE COURSE OF PERCEPTION OF A PICTURE

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Any subject picture represents a certain mental problem. One can perceive and understand it in full only after realizing the system of sense connections in its contents. In order to understand a picture one should somehow abstract himself from the depicted situation, get out of the limits of the visual facts and draw a conclusion mediated by the deductive mental work.

Psychologists (Binet, Stern, Rubinshtein, Ovsepyan and others) revealed different types of perception and verbal description of pictures by children of different age groups. The stability in manifesting these types allows to use them for diagnosing mental disturbances and for determining peculiarities of mental activities if they are sufficiently developed.

We have studied peculiarities of perception and verbal description of a number of subject pictures by deaf and normally hearing children 7-14 years old. Experiments were conducted with fourth and sixth form pupils of schools for the deaf children, with normally hearing preschool children and second and fourth form normal pupils.

We observed four main types of perception of pictures. These types are very close to those usually received in psychological investigations. The first type is characterized by the absence of understanding the main sense of the picture and by enumerating objects and people portrayed on the picture. The second type reveals a certain but poor understanding of the main sense but without any reasoning. The third type represents more complete understanding with some reasoning. Finally, the fourth type marks penetration into various connections of the depicted with great reasoning of the sense.

As one should have expected it turned out that independent description of pictures by deaf schoolchildren were poor in speech forms and abounded with agrammatisms (which have much in common with discoveries made by Gh. I. Shif). However such peculiarities of descriptions do not disguise the fact that from

the point of view of mental activities deaf and normally hearing children produced in general the same types of description.

Descriptions of the second type prevailed with deaf fourth form pupils who understood the main sense of the picture only in the first approximation. At the same time a part of description was overloaded with secondary details; this points to their closeness to the first type which was represented by several cases in the tested group of children. Deaf fourth form pupils occupy an intermediate position between normally hearing preschool children and second form pupils. Sometimes normally hearing preschool children accurately though without any system described depicted objects not understanding the main contents of a picture. Normally hearing second form pupils showed preference to interpreting the sense of a picture over enumerating separate objects; and their descriptions corresponded to the third type.

Deaf sixth form pupils were sometimes able to describe pictures close to the third and fourth types so that the main sense understood in many aspects somehow subjugated the inclusion of some details. Normally hearing schoolchildren produced such descriptions in the majority of cases already in the fourth form.

It is worthwhile to devote special consideration to the character of additions into descriptions of things absent on the picture. Descriptions of the first and second types are characterized by unreasoned additions, various "out of place" connections which do not help solve the mental problem. Such additions were especially numerous with deaf children. With the third and the fourth types additions sometimes served for reasoning the sense. For instance, normally hearing fourth form pupils sometimes produced detailed descriptions of the situation helping to interpret correctly actions of the characters. At the same time deaf sixth form pupils having a certain experience in writing compositions by pictures often used stock phrases known to them completely disregarding and instead of description of the depicted situation. A certain analogy to this may be found in the weakest compositions of normally hearing fourth form pupils.

It is apparent that in teaching of the deaf one should be more strict in distinguishing two ways of working with a picture: a composition and a description of those things only which are depicted on the picture. In the latter case the picture is not a stimulus for developing more or less occasional associations but an object of purposeful perception on the basis of which it becomes possible to build up conclusions on the base of perceived ideas. Such descriptions should be produced by children without assistance because this will encourage them to master written speech and develop their mental activities (works by P. M. Boskis, A. G. Zikeev, K. G. Korovin, Zh. I. Shif and others) and it will also help in the struggle with stock-words. A great part in such descriptions may play generalized ability of deaf school-

children to express various situations in their written speech (A. M. Goldberg). If as a result of special efforts of the teacher deaf schoolchildren will learn the difference between the two above mentioned forms of work with a picture, will learn to subordinate their descriptions to a certain task and perhaps even to describe one and the same picture from different points of view, this will substantially enrich their mental activities.

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**STATTERING AS A DEFECT OF THE COMMUNICATIVE  
FUNCTION OF SPEECH**

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Our research in the field of stammering in children revealed dependence of the defect on the ability of a child to conform his verbal behaviour to the conditions of communication. This provision stressing the role of conditions of communication is regarded by us as a matter of principle.

Out of contact the child gets himself completely free from intermittence of speech. He stops stammering if he does not have a visible interlocutor or if he does have an imaginary company as it happens during a game or in egocentric speech.

We study the communicative function of speech in children with stammering in two directions: the analysis of speech characteristics of the defect and the analysis of nonverbal processes participating in the act of communication.

The first of the above mentioned directions deals with speech means that the child possesses. On the basis of numerous observations we can confidently maintain that stammering appears when the child's speech means do not correspond to demands of the environment in which he is being brought up.

The second direction concerns the problem of nonverbal processes participating in the act of communication. The speech behaviour of a stammering child is determined not only by development of language means but also by their coordination and mobility in the moment of communication, by the ability to cope with highly emotional obstacles accompanying the course of the process of communication.

Psychological research has shown that children with stammering have certain peculiarities of voluntary attention, tempo and stability of activities, ability to switch their attention etc. It may be supposed that peculiarities of the course of voluntary processes have their effect on the organization of an act of speaking as well.

The selection of methods for overcoming stammering in children should be done with consideration of the above mentioned

ideas. Their correct selection provides for various influences directed at the development of a child's speech means, at decreasing deviations in nonverbal processes and at normalization of speech environment.

## ON THE INTERRELATION OF SOUNDS PERCEPTION AND PRONUNCIATION IN SUBJECTS WITH SPEECH DEFECTS

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Questions of the inter-dependence of perception and pronouncement of sounds are of major importance in discovering the reasons for such disorders of pronouncement as sound-substitution and sound-mixture.

A study of the psychological nature of substitution and mixture of sounds (based on experiments carried out according to the method of fixated set) showed the role of inhibition of identical letter-sounds-stimuli (Ransburg phenomenon).

The explanation of the nature of sound-substitution and sound-mixture may be sought in the aspect of theory of set. At the same time during the above mentioned pathology of speech there is a well expressed low level of phonematic hearing. Therefore the question arose of what is the reason for speech errors of this type—an inadequacy of phonematic hearing or of the so-called speech set. It can also be that an important role belongs to both the above mentioned factors.

We studied the thresholds of perception of phonemes and the role of the fixated set in the process of their perception and reproduction. There were two categories of subjects in the experiment those with correct speech and with deficiencies in pronunciation, who were given whistling tape recorded sounds which gradually turned into hissing sounds (by changing the sound frequencies). An objective index of the changes in the sound was the spectrographic analysis. Experiments with fixated set were conducted with the use of acoustic stimuli.

As a result of the experiment a high threshold perception of phoneme was discovered in children suffering from deficiency of pronunciation and of phonematic hearing. By this a certain correlation was established between the pronunciation of sounds, the state of phonematic hearing and perception of phonemes. The experiments also confirmed the influence of the fixated set on the perception of phonemes in the subjects who had disorders of pronunciation, it was noticed that they were inclined to substitute and mix sounds.

## GRAPHIC MISTAKES IN WRITING DISORDERS OF CHILDREN WITH UNDERDEVELOPED SPEECH

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Many investigators, especially abroad, who study defects made by children in reading and writing, consider that the main difficulties are those in the mastering of the forms of letters (the correlation of its elements and their spatial position). In their opinion these difficulties are conditioned by visual-spatial inferiority. Hence, to remove these defects in reading and writing it is advised to develop the visual perception, and the spatial orientation of the children.

Research conducted in the speech therapy department of the Institute of Defectology, showed that the children with speech defects make three times more graphic mistakes, than normally speaking children, and overcome them with greater difficulty.

However a quantitative and qualitative analysis of the mistakes of writing made by children with speech defects shows that the graphic mistakes (difficulty in inscribing the letters forms, its spatial position or quantitative correlation of the elements of the letters) account for only 9% of the overall number of mistakes made, while mistakes of replacing letters according to the phonetic similarity accounted for 30%. Graphic mistakes complicate the picture of writing disorders of children with speech defects, but they certainly don't form the basis of defects. The mistakes caused by difficulties in phonetic differentiation are leading ones.

It was discovered that acquiring corresponding graphic skills depends not only on the visual perception and hand movements, but first and foremost on mastering the language, which would ensure the learning of letters as graphemes. The children who have difficulty in formation phonematic notions are very slow in working out of the graphic images of letters.

Phonematic difficulties may cause various complications when mastering letters. In some cases insufficient discrimination of phonemes influences directly on the formation of graphemes and consequently on the use of the corresponding letters. In other cases graphic mistakes depend on the verbal generalisations, which is vividly manifested only when the child is faced with the too difficult task of giving a sound-letter and morphological analysis of the word. The frequency of graphic mistakes correlates with the quantity of mistakes in the sound and morphological analysis of the word. When such an analysis requires great efforts from the child, then more graphic mistakes appear. Difficulties of the sound analysis lead to a reduction of the visual control, and slacken attention to the outlining of letters.



To detail the nature of graphic mistakes we watched the dynamics and ways of overcoming these mistakes in teaching. We confirmed the dependence of the frequency and stability of graphic mistakes on the general development of oral and written speech of the children. To eliminate the mistakes we had to work out not the realization first and foremost of visual images of the letters, but the development of the phonematic perception.

## SYNTACTIC MISTAKES IN WRITING OF ALALIC CHILDREN

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Research carried out by R. E. Levina has shown that children with alalia have severe disorders of writing. We studied the specificity of syntactic mistakes made by alalic children depending on the nature of the underdevelopment of their oral speech.

We established that such children make not only "sound" mistakes caused by underdevelopment of their phonematic hearing as well as by deficit of their vocabulary (a narrowness of vocabulary and unclearness as to the meaning of words) but that they also make mistakes which show that their grammatical construction of the language is also not well formed. There are a lot of syntactical mistakes among them: missing parts of the sentence, wrong combinations of words (mistakes in concord and government). The most difficult for them is to build a complex sentence. The children are unable to separate the main and subordinate clauses, sometimes they attribute a part of the main clause to the subordinate clause, often they take the subordinate clause as an independent one.

The limitation in speech and lack of grammatical knowledge sometimes prevents the alalic child from understanding of the difference between the clauses of the language and the logic of judgement (as is known, logic and grammar of sentences do not always coincide). As a result of this syntactic mistakes arise.

To prevent writing mistakes, including syntactic mistakes, alalic children should be specially taught to develop in them all the component parts of speech, and this should begin much earlier before syntax is studied in school.

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Издательство «ПРОСВЕЩЕНИЕ»

22.07. 1986 г.

Бумага 60×90<sup>1/16</sup>

3,5 печ. л.

3 уч.-изд. л.

Зак. № 10471

Бесплатно

Литография издательства «Наука». Москва, Шубинский пер., 10